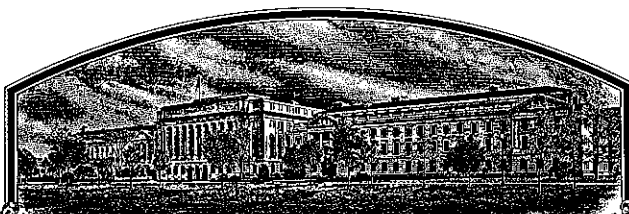


No.

9000165



# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Northrup King Co.**

Whereas, THERE HAS BEEN PRESENTED TO THE  
**Secretary of Agriculture**

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'S28-18'



Attest:

*Kenneth H. Evans*  
Commissioner  
Plant Variety Protection Office  
Agricultural Marketing Service

In Testimony Whereof, I have hereunto set  
my hand and caused the seal of the Plant  
Variety Protection Office to be affixed  
at the City of Washington, D.C.  
this 31st day of December in  
the year of our Lord one thousand nine  
hundred and ninety-one.

*Edward M. Dignan*  
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

# APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)  Northrup King Co.		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.  X8928, J405545	3. VARIETY NAME  S28-18
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)  P. O. Box 959 Minneapolis, MN 55440		5. PHONE (Include area code)  612-593-7333	<b>FOR OFFICIAL USE ONLY</b> PVPO NUMBER <div style="font-size: 2em; text-align: center;">9000165</div>
6. GENUS AND SPECIES NAME  Glycine max	7. FAMILY NAME (Botanical)  Leguminosae	Filing and Examination Fee: \$ 2150 Date May 4, 1990 Time <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	
8. CROP KIND NAME (Common Name)  Soybean	9. DATE OF DETERMINATION  September, 1987	Filing and Examination Fee: \$ 250. Date May 4, 1990 Time <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.	Filing and Examination Fee: \$ 250. Date Dec. 9, 1991 Time <input type="checkbox"/> A.M. <input type="checkbox"/> P.M.
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)  Corporation		11. IF INCORPORATED, GIVE STATE OF INCORPORATION  Delaware	
12. DATE OF INCORPORATION  1976		13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS  Robert W. Romig Northrup King Co. P. O. Box 959 Minneapolis, MN 55440	
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)		PHONE (Include area code): 612-593-7305	

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)

a. ☒ Exhibit A, Origin and Breeding History of the Variety

b. ☒ Exhibit B, Novelty Statement

c. ☒ Exhibit C, Objective Description of Variety

d. ☒ Exhibit D, Additional Description of Variety

e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership

f. ☒ Seed Sample (2,500 viable untreated seeds) Date Seed Sample mailed to Plant Variety Protection Office \_\_\_\_\_

g. ☒ Filing and Examination Fee (\$2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 83(a) of the Plant Variety Protection Act.)

☐ YES (If "YES," answer items 16 and 17 below) ☒ NO (If "NO," skip to item: 18 below)

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?

☐ YES ☒ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?

☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?

☐ YES (If "YES," through ☐ Plant Variety Protection Act ☐ Patent Act Give date \_\_\_\_\_) ☒ NO

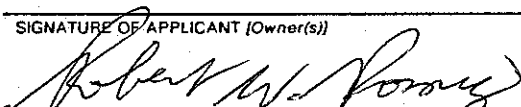
19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?

☐ YES (If "YES," give names of countries and dates) ☒ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT (Owner(s)) 	CAPACITY OR TITLE VICE PRESIDENT, RESEARCH	DATE May 2, 1990
SIGNATURE OF APPLICANT (Owner(s))	CAPACITY OR TITLE	DATE

## EXHIBIT A

## Origin and Breeding History of the Variety

The soybean variety 'S28-18' is derived from the cross 'S30-31' x 'A3127' which was made in 1981 by the soybean research group at St. Joseph, Illinois. The F1 and F2 generations were grown at the Northrup King Research Center near Waimea, Kauai, Hawaii in the winter of 1981-82. The F3 generation was grown in the field at St. Joseph in 1982, the F4 at Waimea in the winter of 1982-83. The F2 to F4 were all advanced by harvesting 2 to 4 pods from each plant. The F5 was planted at St. Joseph in the spring of 1983 and in the fall 100 random plants were harvested and threshed individually. The seed from these plants were grown in F6 progeny rows in 1984. One of these, numbered J405545, was selected based on agronomic appearance to be tested in a preliminary yield trial in 1985. It has been tested at several midwest locations from 1986 to 1989 and found to yield well in comparison to other Maturity Group II cultivars. The line was tested from 1987 to 1989 for reaction to iron-deficiency chlorosis on calcareous soil near Harcourt in North Central Iowa and found to give an intermediate reaction. It was tested for reaction to Phytophthora megasperma and found to be susceptible. During the evaluation of J405545, the descriptive characteristics tawny pubescence, tan pods, and black hilum were identified and confirmed to be homogeneous, but flower color was found to be heterogeneous. In the winter of 1986-87 300 seeds were planted at Waimea and all purple flowered plants were removed. At harvest, 100 plants were threshed individually and their progeny planted at St. Joseph in 1987 to monitor variety variability and to produce Pedigree Seed. A few off-type plants, assumed to have come from outcrosses or mixtures, and two rows which were marginally different maturity were removed. The remaining rows were uniform for white flower color and other characteristics and were bulked to produce Pedigree Seed. The resulting line was subsequently named S28-18. This seed was planted in 1988 to produce Breeder Seed. The increase block was rogued intensively at flowering and prior to harvest. A few plants with grey pubescence were removed. These were assumed to have resulted from admixture.

Foundation Seed of S28-18 was grown in 1989. A few plants with grey pubescence were removed. The Iowa Crop Improvement Association inspected the field and found it to meet the standards for Foundation Seed. The National Soybean Variety Review Board approved the variety for Certification on December 7, 1989.

S28-18 is a stable and uniform variety except that it may contain up to 2% seed with hilum color other than black. In six years of testing and three cycles of seed increase, no variants other than those described previously have been observed.

Varietal purity will be maintained by use of progeny rows as needed.

## EXHIBIT B

## Novelty Statement for the Variety

Soybean variety S28-18 is most similar to Preston. It can be differentiated from Preston based on flower color and pod color. S28-18 has white flowers and tan pods while Preston has purple flowers and brown pods.

U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
LIVESTOCK, MEAT, GRAIN & SEED DIVISION  
PLANT VARIETY PROTECTION OFFICE  
BELTSVILLE, MARYLAND 20705

EXHIBIT C  
(Soybean)

OBJECTIVE DESCRIPTION OF VARIETY  
SOYBEAN (*Glycine max* L.)

NAME OF APPLICANT(S) Northrup King Co.	TEMPORARY DESIGNATION	VARIETY NAME S28-18
ADDRESS (Street and No., or R.F.D. No., City, State, and Zip Code) P. O. Box 959 Minneapolis, MN 55440 Attention: R.W. Romig		FOR OFFICIAL USE ONLY PVPO NUMBER 9000165

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g.,   ).

## 1. SEED SHAPE:



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)  
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)

2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)  
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

## 2. SEED COAT COLOR: (Mature Seed)

1 = Yellow      2 = Green      3 = Brown      4 = Black      5 = Other (Specify) \_\_\_\_\_

## 3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

1 = Dull ('Corsoy 79'; 'Braxton')      2 = Shiny ('Nebsoy'; 'Gasoy 17')

## 4. SEED SIZE: (Mature Seed)

Grams per 100 seeds

## 5. HILUM COLOR: (Mature Seed)

1 = Buff      2 = Yellow      3 = Brown      4 = Gray      5 = Imperfect Black      6 = Black      7 = Other (Specify) \_\_\_\_\_  
May contain up to 2% other hilum color.

## 6. COTYLEDON COLOR: (Mature Seed)

1 = Yellow      2 = Green

## 7. SEED PROTEIN PEROXIDASE ACTIVITY:

1 = Low      2 = High

## 8. SEED PROTEIN ELECTROPHORETIC BAND:

1 = Type A (SP1<sup>a</sup>)      2 = Type B (SP1<sup>b</sup>)

## 9. HYPOCOTYL COLOR:

1 = Green only ('Evans'; 'Davis')      2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')  
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')  
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

## 10. LEAFLET SHAPE:

1 = Lanceolate      2 = Oval      3 = Ovate      4 = Other (Specify) \_\_\_\_\_

## 11. LEAFLET SIZE:

☒ 21 = Small ('Amsoy 71'; 'A5312')  
3 = Large ('Crawford'; 'Tracy')

2 = Medium ('Corsoy 79'; 'Gasoy 17')

## 12. LEAF COLOR:

☒ 21 = Light Green ('Weber'; 'York')  
3 = Dark Green ('Gnome'; 'Tracy')

2 = Medium Green ('Corsoy 79'; 'Braxton')

## 13. FLOWER COLOR:

☒ 1

1 = White

2 = Purple

3 = White with purple throat

## 14. POD COLOR:

☒ 1

1 = Tan

2 = Brown

3 = Black

## 15. PLANT PUBESCENCE COLOR:

☒ 2

1 = Gray

2 = Brown (Tawny)

## 16. PLANT TYPES:

☒ 21 = Slender ('Essex'; 'Amsoy 71')  
3 = Bushy ('Gnome'; 'Govan')

2 = Intermediate ('Amcor'; 'Braxton')

## 17. PLANT HABIT:

☒ 3

1 = Determinate ('Gnome'; 'Braxton')

2 = Semi-Determinate ('Will')

3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

## 18. MATURITY GROUP:

☒ 5

1 = 000

2 = 00

3 = 0

4 = I

5 = II

6 = III

7 = IV

8 = V

9 = VI

10 = VII

11 = VIII

12 = IX

13 = X

## 19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

## BACTERIAL DISEASES:

☐Bacterial Pustule (*Xanthomonas phaseoli* var. *sojensis*)☒ 1Bacterial Blight (*Pseudomonas glycinea*)☐Wildfire (*Pseudomonas tabaci*)

## FUNGAL DISEASES:

☐Brown Spot (*Septoria glycines*)Frogeye Leaf Spot (*Cercospora sojina*)☐

Race 1

☐

Race 2

☐

Race 3

☐

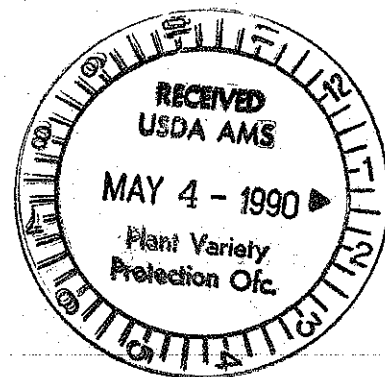
Race 4

☐

Race 5

☐

Other (Specify)

☐Target Spot (*Corynespora cassicola*)☐Downy Mildew (*Peronospora trifoliorum* var. *manshurica*)☐Powdery Mildew (*Microsphaera diffusa*)☒ 2Brown Stem Rot (*Cephalosporium gregatum*) (Horizontal Resistance based on field observation)☐Stem Canker (*Diaporthe phaseolorum* var. *caulivora*)

## 19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

## FUNGAL DISEASES: (Continued)

☒ 1 Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae*)  
☒ 1 Purple Seed Stain (*Cercospora kikuchii*)  
☐ Rhizoctonia Root Rot (*Rhizoctonia solani*)  
 Phytophthora Rot (*Phytophthora megasperma* var. *sojae*)  
☒ 1 Race 1   ☒ 1 Race 2   ☒ 1 Race 3   ☒ 1 Race 4   ☒ 1 Race 5   ☒ 1 Race 6   ☒ 1 Race 7  
☒ 1 Race 8   ☒ 1 Race 9   ☐ Other (Specify) \_\_\_\_\_

## VIRAL DISEASES:

☐ Bud Blight (Tobacco Ringspot Virus)  
☐ Yellow Mosaic (Bean Yellow Mosaic Virus)  
☐ Cowpea Mosaic (Cowpea Chlorotic Virus)  
☐ Pod Mottle (Bean Pod Mottle Virus)  
☒ 1 Seed Mottle (Soybean Mosaic Virus)

## NEMATODE DISEASES:

Soybean Cyst Nematode (*Heterodera glycines*)  
☒ 1 Race 1   ☒ 1 Race 2   ☒ 1 Race 3   ☒ 1 Race 4   ☐ Other (Specify) \_\_\_\_\_  
☐ Lance Nematode (*Hoplolaimus Colombus*)  
☐ Southern Root Knot Nematode (*Meloidogyne incognita*)  
☐ Northern Root Knot Nematode (*Meloidogyne Hapla*)  
☐ Peanut Root Knot Nematode (*Meloidogyne arenaria*)  
☐ Reniform Nematode (*Rotylenchulus reniformis*)  
☐ OTHER DISEASE NOT ON FORM (Specify): \_\_\_\_\_

## 20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

☒ 1 Iron Chlorosis on Calcareous Soil   Moderately susceptible or intermediate  
☐ Other (Specify) \_\_\_\_\_

## 21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

☐ Mexican Bean Beetle (*Epilachna varivestis*)  
☐ Potato Leaf Hopper (*Empoasca fabae*)  
☐ Other (Specify) \_\_\_\_\_

## 22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	Preston	Seed Coat Luster	S42-30
Leaf Shape	S20-26	Seed Size	S34-19
Leaf Color	A3127	Seed Shape	S27-10
Leaf Size	Preston	Seedling Pigmentation	Williams 82

## 23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/POD
				CM Width	CM Length	% Protein	% Oil		
S28-18 Submitted	126	2.1	84	5.3	9.6	39.7	20.6	13.6	2-3
Preston Name of Similar Variety	123	2.2	85	5.2	9.8	39.6	21.0	14.1	2-3

## PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A<sub>2</sub> in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.





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EXHIBIT D

Additional Description of the Variety

Soybean variety S28-18 is a mid to late Maturity Group II cultivar maturing between Preston and Pella 86. It exhibits long hypocotyl extension when planted in sand at 12 cm depth at 25° C. It exhibits normal tolerance to metribuzin herbicide.

## EXHIBIT E

## Statement of the Basis of Applicant's Ownership

Soybean variety S28-18 was developed by the Northrup King Co. soybean breeding staff from germplasm sources cited in Exhibit A of this application. Northrup King Co. believes that the variety is novel as defined in the Plant Variety Protection Act and, therefore, that Northrup King Co. is the sole owner of the variety.